

WHAT IS CLAIMED IS:

1. Fuel-fired heating apparatus comprising:

a combustion chamber having an interior side portion;

5 a fuel burner extending through said combustion chamber in a spaced apart relationship with said interior side portion thereof, said fuel burner having a burner side portion facing said interior side portion of said combustion chamber; and

10 an insulation structure sandwiched between and contacting said burner side portion and said interior side portion of said combustion chamber, said insulation structure being resiliently compressible between said burner side portion and said interior side portion of said combustion chamber in response to thermal expansion of said fuel burner during firing thereof.

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2. The fuel-fired heating apparatus of Claim 1 wherein:

said fuel burner is a premix-type fuel burner.

3. The fuel-fired heating apparatus of Claim 1 wherein:

20 said interior side portion of said combustion chamber is defined by a relatively rigid insulation material.

4. The fuel-fired heating apparatus of Claim 3 wherein:

25 said relatively rigid insulation material is a fiberboard insulation material.

5. The fuel-fired heating apparatus of Claim 1 wherein:

said insulation structure is a ceramic fiber insulation blanket.

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6. The fuel-fired heating apparatus of Claim 1 wherein;
said insulation structure substantially prevents uncombusted fuel
flow between said fuel burner and said interior side portion of said
combustion chamber.

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7. The fuel-fired heating apparatus of Claim 1 wherein:
said fuel-fired heating apparatus is a boiler.

10 8. The fuel-fired heating apparatus of Claim 7 wherein:

said boiler is a gas-fired boiler.

9. The fuel-fired heating apparatus of Claim 1 wherein:

said fuel burner is a first fuel burner,

15 said heating apparatus further comprises a second fuel burner
extending through said combustion chamber in a spaced apart
relationship with said first fuel burner, and

said first and second fuel burners are operable in a staged manner.

20 10. The fuel-fired heating apparatus of Claim 1 wherein:

said fuel burner is a gas burner.

11. Fuel-fired heating apparatus comprising:
a combustion chamber having a bottom interior side portion;
a heat exchanger structure horizontally extending through said
combustion chamber and being adapted to receive a through-flow of a
5 fluid to be heated;
a plurality of tubular fuel burners longitudinally extending
horizontally through said combustion chamber in a laterally spaced apart
mutually parallel orientation, said fuel burners being positioned below
said heat exchanger structure and having bottom side portions spaced
10 upwardly apart from and facing said bottom side portion of said
combustion chamber;
control apparatus operative to provide for staged firing of said fuel
burners to heat fluid flowing through said heat exchanger structure; and
a resilient insulation structure sandwiched between and contacting
15 said bottom interior side portion of said combustion chamber and said
bottom side portions of said fuel burners, said resilient insulation
structure being resiliently compressible by differential thermal expansion
of said fuel burners during firing thereof.

20 12. The fuel-fired heating apparatus of Claim 11 wherein:
said fuel-fired heating apparatus is a boiler.

13. The fuel-fired heating apparatus of Claim 11 wherein:
said fuel burners are gas burners.

25 14. The fuel-fired heating apparatus of Claim 11 wherein:
said fuel burners are premix-type fuel burners.

15. The fuel-fired heating apparatus of Claim 11 wherein:
said bottom interior side portion of said combustion chamber is
defined by a relatively rigid insulation material.

5 16. The fuel-fired heating apparatus of Claim 15 wherein:
said relatively rigid insulation material is a fiberboard material.

17. The fuel-fired heating apparatus of Claim 11 wherein:
said resilient insulation material is an insulation blanket structure.

10 18. The fuel-fired heating apparatus of Claim 17 wherein:
said insulation blanket structure is a ceramic fiber material.

19. The fuel-fired heating apparatus of Claim 11 wherein:
15 said resilient insulation structure substantially prevents flow of
uncombusted fuel from firing burners through any portion of the vertical
space between said fuel burners and said bottom interior side portion of
said combustion chamber.

20 20. The fuel-fired heating apparatus of Claim 19 wherein:
said bottom interior side portion of said combustion chamber is
defined by a relatively rigid fiberboard insulation material, and
said resilient insulation material is a ceramic fiber insulation blanket
structure.

21. Fuel-fired heating apparatus comprising:
a combustion chamber;
a fuel burner extending through said combustion chamber and
having a first side portion with fuel/air mixture discharge openings
5 formed therein, and a second side portion opposite said first side portion;
and
a resilient insulation structure held against only said second side
portion of said fuel burner and being resiliently compressible by said
second side portion of said fuel burner in response to thermal expansion
10 of said fuel burner during firing thereof.

22. The fuel-fired heating apparatus of Claim 21 wherein:
said fuel burner is a gas burner.

15 23. The fuel-fired heating apparatus of Claim 21 wherein:
said fuel burner is a premix-type fuel burner.

24. The fuel-fired heating apparatus of Claim 21 wherein:
said fuel-fired heating apparatus is a boiler.

20 25. The fuel-fired heating apparatus of Claim 24 wherein:
said boiler is a gas-fired boiler.

26. The fuel-fired heating apparatus of Claim 21 wherein:
25 said fuel burner is a first fuel burner,
said heating apparatus further comprises a second fuel burner
extending through said combustion chamber in a spaced apart
relationship with said first fuel burner; and
said first and second fuel burners are operable in a staged manner.

27. The fuel-fired heating apparatus of Claim 21 wherein:
said resilient insulation structure is sandwiched between said second
side portion of said fuel burner and a relatively rigid structure disposed
within said combustion chamber.

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28. The fuel-fired heating apparatus of Claim 21 wherein:
said relatively rigid structure is a relatively rigid insulation structure.

29. The fuel-fired heating apparatus of Claim 21 wherein:
10 said resilient insulation structure is a ceramic fiber insulation blanket
structure.

30. Fuel-fired heating apparatus comprising:
a combustion chamber having an interior side portion;
a fuel burner extending through said combustion chamber in a
spaced apart relationship with said interior side portion thereof, said fuel
burner having a burner side portion facing said interior side portion of
said combustion chamber; and
a structure sandwiched between and contacting said burner side
portion and said interior side portion of said combustion chamber.

10 31. The fuel-fired heating apparatus of Claim 30 wherein:
said structure substantially prevents uncombusted fuel flow
between said fuel burner and said interior side portion of said combustion
chamber.

15 32. The fuel-fired heating apparatus of Claim 30 wherein:
said structure is of a resilient material.

33. The fuel-fired heating apparatus of Claim 30 wherein:
said structure is of an insulative material.

20 34. The fuel-fired heating apparatus of Claim 33 wherein:
said structure is of a ceramic fiber insulation material.

35. Fuel-fired heating apparatus comprising:
a combustion chamber having a bottom interior side portion;
a heat exchanger structure horizontally extending through said combustion chamber and being adapted to receive a through-flow of a
5 fluid to be heated;
a plurality of tubular fuel burners longitudinally extending horizontally through said combustion chamber in a laterally spaced apart mutually parallel orientation, said fuel burners being positioned below said heat exchanger structure and having bottom side portions spaced
10 upwardly apart from and facing said bottom side portion of said combustion chamber;
control apparatus operative to provide for staged firing of said fuel burners to heat fluid flowing through said heat exchanger structure; and
15 a structure sandwiched between and contacting said bottom interior side portion of said combustion chamber and said bottom side portions of said fuel burners.

36. The fuel-fired heating apparatus of Claim 35 wherein:

20 said structure substantially prevents uncombusted fuel flow between bottom interior side portion of said combustion chamber and said bottom side portions of said fuel burners.

37. The fuel-fired heating apparatus of Claim 35 wherein:

25 said structure is of a resilient material.

38. The fuel-fired heating apparatus of Claim 35 wherein:

30 said structure is of an insulative material.

39. The fuel-fired heating apparatus of Claim 38 wherein:

30 said structure is of a ceramic fiber insulation material.